REMARKS

The Office Action has objected to the title. In addition, it has rejected Claims 28-59 under 35 U.S.C. §112, second paragraph, as allegedly failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It has further rejected Claims 46-49, 52, 53 and 55 under 35 U.S.C. §102(b) as defining subject matter which is allegedly anticipated by the teachings in JP 1248460 ("J '460). Moreover, Claims 28, 30, 32, 33, 35, 40, 44, 44, 46-51, 53 and 55 are rejected under 35 U.S.C. §102(b) as defining subject matter which is allegedly anticipated by JP 11067183 ("J '183"). Further, the Office Action has rejected Claims 46-51, 53 and 55 under 35 U.S.C. §102(b) as defining subject matter which is allegedly anticipated by the teachings in JP 1100793 ("J '793"). Further, Claims 28, 32-35, 46, 53, 55 and 56 are rejected under 35 U.S.C. §102(b) as defining subject matter which is allegedly anticipated by JP 09012752 ("J '752"). Claims 28, 32-34, 46, 53, 55 and 59 are rejected under 35 U.S.C. §102(b) as defining subject matter which is allegedly anticipated by the teachings in JP 09-143884 ("J '884"). In addition, Claims 46, 48, 49, 50, 53 and 55 are rejected under 35 U.S.C. §102(b) as defining subject matter which is allegedly anticipated by the teachings in JP 4253231 ("J '231"). Furthermore, Claims 28, 29, 31, 33, 36, 37, 42, 43, 46, 53, 55 and 56 are rejected under 35 U.S.C. §102(e) as defining subject matter which is allegedly anticipated by U.S. Patent No. 6,213, 604 to Valent, Jr., et al. ("Valent, Jr., et al."). In addition, Claims 28, 29. 31, 33, 36, 37, 42, 43, 46, 53, 55 and 56 are rejected under 35 U.S.C. §102(e) as defining subject matter which is allegedly anticipated by the teachings in U.S. Patent No. 6,200,626 to Grobe III, et al. ("Grobe III, et al."). Furthermore, Claims 28, 32-34, 46, 53, 55 and 59 are rejected under 35 U.S.C. §102(b) as defining subject matter which is allegedly anticipated by the teachings in JP4136207 ("J '207"). In addition, Claims 28, 32-35, 46, 48-53, 55, 56 and 59 are rejected under

35 U.S.C. §102(b) as defining subject matter which is anticipated by the teachings in JP07-090783 ("J '783"). Claims 28, 32-35, 46, 48-53, 55, 56 and 59 are rejected under 35 U.S.C. §102(b) as defining subject matter which is allegedly anticipated by the teachings in U.S. Patent No. 4,678,838 ("Janssen"). Finally, Claims 28, 29, 32-36, 38, 40-42 and 46-59 are rejected under 35 U.S.C. §102(b) as defining subject matter which is allegedly anticipated by the teachings in U.S. patent No. 5,889,073 to Zhang, et al. ("Zhang, et al.").

Applicant has amended the claims, which when considered with the comments hereinbelow are deemed to place the present case in condition for allowance. Favorable action is respectfully requested.

At the outset, before addressing the merits of the rejection, it is to be noted that Claims 28, 29, 30, 31, 32, 33, 35, 38, 39 and 44-59 have been amended. Claim 28 has been amended to explicitly recited that which was implicit. More specifically, Claim 28 recite that the method comprises subjecting to polymeric material to an activation step followed by treatment with a hydrophilic polymer in the presence of a catalyst or initiator. Support for the amendment is found on Page 7, line 14 to Page 10, line 28 and Page 12, line 5 to Page 13, line 24 of the instant specification. Claims 29-31 have been rewritten into better English. Claim 32 has been rewritten to remove superfluous language. In addition, the term carbon fiber material has been corrected to "carbon material", in accordance with the teaching on Page 6, line 6 of the instant specification. Claim 32 has also been amended to recite the subject matter therein in more proper Markush language. Moreover, Claim 32 has been rewritten to correct a typographical error in the spelling of the term "polychlal". Support can be found on Page 6, line 13 of the instant specification.

Claim 33 has been amended to change the term "product" into parts and to remove superfluous language. Claim 35 has been amended to correct the spelling of a compound name. Moreover, Claims 38, 39, 44-59 have been amended to place the subject matter into more proper Markush format.

No new matter has been added to the application.

Pursuant to the rejection of Claims 28-59 under 35 U.S.C. §112, second paragraph, the Office Action provides several grounds to support its rejection. For example, the Office Action rejects the claims, alleging that the term "hydrophilic polymer treatment" is unclear. Contrary to the allegations in the Office Action, it is respectfully submitted that the term is not indefinite. The term is defined in the underlying specification. See, for example, Page 12, line 5 to Page 13, line 24 of the instant specification. As defined therein, the term "hydrophilic polymer treatment" refers to a treatment of the activated polymeric material with a hydrophilic polymer. Thus, there is no ambiguity as to the meaning of the phrase.

Furthermore, in Claim 32, the term "other compounds having carbon-carbon double bond" has been deleted since it is superfluous. Moreover, the term "carbon fiber material" has been amended to recite "carbon material" as defined on page 6, line 6 of the instant specification. Claim 33 has been amended to delete the second occurrence of sheets, and to change "product" to "parts". Moreover, it is respectfully submitted that the phrase "members or products of molded materials in a given shape" is clear from the teachings of the underlying application. As described therein, the term means any form ("shape") other than fibers, woven fabrics, knitted webs, non-woven fabrics, plates, rods, films, sheets or porous film. See, for example, Page 6, line 28, to page 7, line 5 of the instant specification

The phrase "composite materials with other materials" means a polymeric material contained in said composite. As used herein, it refers to a composite which consists of plural polymeric materials or a composite consisting of a polymeric material and another material. See, e.g., page 6, line 14-15 of the instant specification.

Claim 35 was amended to correct an obvious typographical error and Claims 33, et seq. have been rewritten to place the subject matter into more proper Markush language.

Applicant respectfully submits that the claims, as amended, define the metes and bounds of the claimed subject matter. The claimed subject matter is clear and is not ambiguous. Therefore, the rejection of Claims 28-59 under 35 U.S.C. §112, first paragraph is obviated; withdrawal thereof is respectfully requested.

The claimed subject matter is directed to a method of modifying a polymeric material which encompasses two steps: activation treatment and a hydrophilic treatment of the activated polymeric material.

More specifically, the characteristics of products prepared in the present invention are as follows: the activation treatment process is to introduce functional groups containing oxygen or nitrogen, etc. into the polymeric materials (see, for example, page 7, lines 15-18 of the present specification). Examples of the Activation Treatment process includes, inter alia, ozone treatment, plasma treatment, ultraviolet radiation treatment, high voltage electric discharge treatment, and corona discharge treatment. The polymer materials are oxidized by the activation process. To maximize the effect of the activation treatment, the polymer may be subjected to a solvent treatment. For example, if the polymer material does not have a large surface area, a solvent treatment is performed prior to the activation step to accelerate the activation. As a result

of the activation treatment, a layer of functional groups is formed on the surface of the activated polymer materials.

In a hydrophilic polymer treatment step, the polymeric material activated by the active treatment reacted with a hydrophilic polymer in the presence of catalysts or initiators. Thus, the catalysts or initiators promote the reaction of the hydrophilic polymer with the functional groups produced by the step of activation treatment. Consequently, a considerable number of chemical bonds can be and are formed between hydrophilic polymers and the functional groups on the surface of the polymeric material.

The resulting material thus has a surface structure comprising two layers: an activated layer (the first layer) and a hydrophilic layer (the second layer) bound to the first layer. As a result, the resulting polymeric material has hydrophilic properties. For example, it has a high water absorptive property. This process enhances the water absorptive property of the resulting polymer.

The hydrophilic polymer used in the present invention contains several functional groups such as, hydroxyl groups to react with a polymer material. When an activated polymer material is treated by a hydrophilic polymer in the presence of a catalyst or initiator under conditions effective to produce the modified polymer, in accordance with the present invention, a cross-linking reaction occurs, creating a cross-link between the functional groups in the polymer material and those in the hydrophilic polymer. (Such a reaction between polymers is usually called as "a polymer reaction"). See, for instance, Table 1 on page 36 of the present specification gives a durability of the specimens prepared by the present process with comparative examples. The specimens prepared by the present process is resistant to several severe washings with boiling water containing a detergent in accordance with the washing

fastness test. This shows that there are many binding points formed between the hydrophilic polymer and the activated polymer material (substrate). On the other hand, as shown hereinbelow, when a representative prior art specimen, such as the product of Comparative Example 1, which was a non-woven fabric of JP67183(1993), was subjected to severe washing with boiling water, containing a detergent, in accordance with the severe washing fastness test, it could not resist the many thermal treatments, indicating that there are very few binding points between the polymer and the graft polymer.

The hydrophilic polymer treatment in the present invention is thus different from a polymer coating or a graft polymerization in the prior art. Usually, in a graft polymerization, a monomer initiates its polymerization at a point formed on the main polymer substrate by a catalyst, a UV irradiation and a plasma treatment. Consequently, the formed graft polymer is basically bound to the polymer substrate at its molecular end. If a growing graft polymer can be reacted with the polymer substrate by an energy irradiation or a catalyst, the number of binding points is substantially fewer than that made in a polymer reaction such as the present hydrophilic polymer treatment. On the other hand, in the present invention, graft polymerization of a monomer to a polymer material occurs after the polymer material is treated by an activation step and a subsequent hydrophilic polymer treatment. These previous treatments facilitate graft polymerization because these treatments prior to graft polymerizations form several functional groups which may be changed to initiation points for grafting. Thus, the present hydrophilic polymer treatment is completely different from a simple graft polymerization.

For instance, when polyvinyl alcohol (PVA) with the degree of polymerization of 1500 is used in the hydrophilic polymer treatment, in accordance with the present invention a number of PVA molecular chains lie on the activated surface of the polymeric material and each

of the PVA molecular chains makes a considerable number of chemical bonds between the hydroxyl group of PVA molecules and the functional group of the activated layer of the polymeric material. As a hydrophilic polymer chain has a lot of functional groups such as hydroxyl groups, carboxylic group, amide groups, sulfonic groups, etc. (see, for example, page 11, line 25 to page 12, line 1 in the present specification), a considerably number of chemical bonds can be formed between the hydrophilic polymer chain and the functional groups of the activated surface of the polymeric material.

When an activated polymeric material is only coated with a hydrophilic polymer as seen in some of the cited prior art, the resulting polymeric material has a chemical structure which is different from that obtained in the present invention, for example, chemical bonds are not formed between the polymeric material and the coated hydrophilic polymer. Furthermore, when the surface of an activated polymeric material is subjected to a monomer grafting (or graft-polymerization) by the methods of some of the cited references and without proceeding through the modification steps of the present process, each of the graft polymer chains are formed from the active points which are produced on the surface of the polymeric material by catalysts or active radiation, etc., but, each of the graft polymer chains are bound to the polymeric material only at the chain end. Thus, the chemical structure of the graft polymers layer is different from that of the hydrophilic polymer layer produced by the method of the present invention.

In contrast, in the present invention, when a polymeric material modified by the step of an activation treatment and the subsequent step of a hydrophilic polymer treatment is further subjected to the step of a monomer grafting treatment, as in Claims 29 and 31, the graft-polymerization can start at a considerable number of active points which was produced on the hydrophilic polymer layer by initiators or catalysts. Thus, the resulting polymeric material has a

surface structure which comprises three layers; an activated surface layer, a hydrophilic polymer layer and a graft-polymer layer. The monomer grafting gives a further durable hydrophilic property and an improvement of the adhesive property, water absorptive property to the substrate, polymeric material. However, the extent of these additional properties are dependent on the selection of the kind of monomers.

The Office Action cites several references which are alleged to anticipate the present invention. Applicant respectfully submits that none of the references teach or disclose the present invention. It is well established by case law has held that anticipation requires that each and every element of a claim to be described explicit or inherently within the four corners of the reference. Any difference between the claims and the reference negates anticipation Kalman v. Kimberley-Clark Corp., 713 F2d. 760, 771-772, 218 USPQ 781, 789, (Fed. Cir. 1985).

Applicant respectfully submits that none of the cited references anticipate the present invention.

In support of the rejection of Claims 48-49, 52, 53 and 55 under 35 U.S.C. §102(b), the Office Action cites J '460. J '460 discloses a porous body comprising polyolefin fibers whose surfaces are covered with acetalized polyvinyl alcohol. However, the activation treatment process in the present invention is not carried out in J '460, i.e., a layer of functional groups is not formed in the product obtained by the method of J '460. More specifically, it is clear that the polyolefin fibers are coated with the acetalized polyvinyl alcohol. The abstract makes no mention of activating the polyolefin fibers prior to coating it with the acetalized polyvinyl alcohol. In addition, the porous body comprising polyolefin fibers is only dipped in a polyvinyl alcohol solution in the process of J '460. Thus, no chemical bonds are formed between

the porous body and polyvinyl alcohol. The method of J '460 discusses only a polymer coating process. Thus, the structure of the product therein is quite different from that of the present invention. There are no covalent bonds formed between the acetalized polyvinyl alcohol and the polyolefin fibers; on the other hand, in the structure of the present invention, there are several covalent bonds formed between the polymeric material and the hydrophilic polymer.

Although the thus treated non-woven fabrics of J'460 exhibit hydrophilic properties, their durability is very low because the treatment only creates a coating. In addition, the coated non-woven fabrics do not have the advantages of the present invention in that when the non-woven fabrics of J '460 are used as battery separators, they shrink and cause short-circuiting in the batteries.

Thus, J '460 does not disclose or describe the subject matter of the rejected claims. Consequently, J '460 does not anticipate the subject matter of the rejected claims; withdrawal thereof is respectfully requested.

In support of the rejection of Claims 28, 32, 33, 35, 40, 44, 46-51, 53 and 55 under 35 U.S.C. §102(b), the Office Action cites J '183.

J '183 disclose a separator having permanent hydrophilic characteristic. It discloses that it is formed from the treatment of a polyolefin polymer with a hydrophilic resin in the presence of persulfate.

The J '183 reference does not teach, disclose or suggest the present invention.

With respect to the process claims, as described hereinabove, the present process comprises two steps: subjecting the polymeric material to an activation treatment, and treating said activated polymeric material with a hydrophilic polymer under conditions effective to produce said modified polymer, wherein the step of a hydrophilic polymer-treatment is carried

out in the presence of a catalysts or initiators. In the present invention, persulfate is used as one of initiators in the hydrophilic polymer treatment (see page 12, line 11 of the present speciation).

However, contrary to the allegations in the Office Action, the reference fails to teach or disclose the two steps. More specifically, it fails to teach or disclose the activation step. As described, the purpose of activation treatment process is to introduce functional groups containing oxygen or nitrogen into polymeric materials by various treatment, e.g., ozone, uv light, discharging processes and the like. The persulfate treatment, as described in the application is used as one of the initiators of the hydrophilic polymer treatment (See, page 12, line 11 of the instant application). Thus, the teachings in the prior art reference teaches, at most, the hydrophilic treatment, i.e., subjecting the polymeric material with a hydrophilic polymer in the presence of a initiator. It does not teach any activation step whatsoever. Moreover, to further distinguish the process described in the J '183 from the process of the present invention, it is to be noted that in the present process, activation occurs prior to the step of treating the polymeric material with hydrophilic polymer in the presence of a catalyst or initiator. They are two separate steps. On the other hand, in J '183, the treatment of the polypropylene with the hydrophilic polymer occurs in the presence of persulfate; thus there is no activation step separate and apart from the hydrophilic treatment step. In fact, as indicated hereinabove, J '183 fails to disclose any activation step. Thus, since the processes are different, the '183 patent does not teach or disclose the present process.

Moreover, the products produced by the present process is different from that produced in J '183. Since the product formed in J '183 was produced by only the hydrophilic polymer treatment step and without the activation step, the product thus formed does not contain or form a layer of functional groups on the surface of the polymeric material as in the present

case. Thus, the structure of the product formed is different. To further show the difference, attention is given to Comp. Ex. 1 in the instant specification. The product thus produced was prepared in accordance with the teachings in J '183. This product is compared with the product of Example 1 which was produced in accordance with the present process. As clearly shown by the data in Table I, the product prepared in accordance with the procedure of J '183 had a much lower water absorption in the washing fastness then a product produced by the present process (Example 1). As explained hereinabove, this difference in water absorption ability is reflected in the differences in the structures of the two products.

Thus, the evidence shows that the product in J '183 is different from that produced in accordance with the present invention.

Consequently, for the reason provided, J '183 does not anticipate the subject matter of the rejected claims. Withdrawal of the rejection is respectfully requested.

Pursuant to the rejection of Claims 46-51, 53 and 55 under 35 U.S.C. §102(b), the Office Action cites J '937. J'937 disclose a battery separating manufacturing method. According to the abstract, the battery separator is manufactured by a method of physically and/or chemical bonding a polymer containing a vinyl monomer and/or vinyl oligomer with an ester linkage to the fiber surface of a non-woven fabric and then hydrolyzing the ester linkage to produce an acid radical.

J' 937 discloses a grafting method. More specifically, the non-woven fabric is coated physically or bound chemically by methods, such as grafting without an activation step. Thus, the prior art reference gives a polymer coating or polymer grafted to woven fabrics. Thus, as explained hereinabove, even if grafted chemically, the structure of the product is different since the coated polymer is attached to the fabric only at the chain end.

This structure is quite different from the structure of the present invention. In the present invention, a hydrophilic polymer chain is chemically bond to the functional groups in the activated surface of the polymeric material, wherein the covalent bond is attached at several places in the polymeric material.

Thus, the chemical structure of the product in the present invention and J '937 is different from that of the present invention. Consequently, J '937 does not anticipate the present invention. Withdrawal of the rejection is respectfully requested.

With respect to the rejection of Claims 28, 32-35, 46, 53, 55 and 56 under 35 U.S.C. §102(b), the Office Action cites J '752. J'752 discloses applying a corona discharge treatment to a polystyrene sheet and coating the treated sheet with a polymeric material having hydrophilic groups.

In the specification of J'752, the method for coating the treated sheet with a polymeric material having hydrophilic groups is explained as follows: after a sheet made of polystyrene or polystyrene-like resin is subjected to a corona discharge treatment, a polymeric material having hydrophilic groups is coated with the treated sheet and the coated sheet is dried. In addition, it discloses the following coating methods that can be used to obtain a homogeneously coating: reverse rotation rolling, proper rotation rolling, kiss-rolling, casting, spraying, curtain coating and extruding, and air doctor, blade, rod, knife, squeezing and dipping. Thus, in J'752, the surface of a polystyrene resin sheet is subjected to a corona discharge treatment and subsequently coated with a coating material having hydrophilic groups, such as a polymeric compound having hydroxyl groups, carboxyl groups or amino groups, in a coating amount of 50-3000mg/m2 to form a coating film thereon. It discloses that the corona discharge treatment forms hydrophilic functional groups on the polystyrene sheet and the coating film has

also hydrophilic functional groups. It states that the corona discharge treatment was made in order to get a good adhesion of the film in the specification. Thus, this describes only an adhesion between a styrene sheet and a coated polymer. By their method, there is no way to activate the polymer, i.e., make chemical bonds between them as in the present case. Instead, a hydrogen bond and intermolecular forces contribute to this adhesion between the polymer and the styrene sheet. Their aim was only to get a transparent polystyrene sheet coated a hydrophilic polymer. Thus, the J '737 reference only discloses a method of coating a polymer, as such their method is different from the process of the present invention. The reference fails to disclose treating the hydrophilic polymer in the presence of catalyst or initiators. A review of the abstract clearly discloses that no catalyst or initiator is mentioned therein. Thus, the two processes are different.

As described above, in the product of the present invention, a hydrophilic polymer chain is chemically bound to the functional groups in the activated surface of the polymeric material with a considerable number of binding points. On the other hand, the polymeric material obtained in J '752 contains only a polymer coating structure. Without carrying out the coating in the presence of catalyst or initiators, the prior art reference cannot make a structure wherein the polymeric material therein is chemically bound to the hydrophilic polymer at a number of points on the surface thereof, as in the present invention. Consequently, the hydrophilic polymer film could be removed easily.

Thus, both the method and the chemical structure of the product in J'752 are different from those of the present invention. Thus J '752 does not anticipate the rejected claims. Withdrawal of the rejection is respectfully requested.

Pursuant to the rejection of Claims 28, 32-34, 46, 53, 55 and 59, the Office Action

cites J' 884. J'884 discloses a plasma treatment to a synthetic fiber cloth and applying a hydrophilic resin thereto.

Before addressing the merits, it is to be noted that in the abstract of J'884, the phrase "pudding method" is used. This should be corrected to the "padding method".

In J'884, crosslinkable polysiloxane derivatives are applied to a cloth made of synthetic fibers such as polyester. After padding the cloth in the polymer derivatives, the material is dried and cured. Then, the treated cloth is subjected to a low temperature plasma treatment. Finally, the resultant cloth is also applied with a hydrophilic resin by a padding-drying-curing method.

The padding method of this prior art is different from the process of the present invention wherein the hydrophilic polymer treatment step is carried out in the presence of catalyst or initiators. In the prior art method, the polymer treatment is not carried out in the presence of catalyst or initiator. Thus, the process of the prior art and the present invention is different. Since the process of the J '884 is different from the present process, the product formed by the present process is quite different. More specifically, in accordance with the present process, a hydrophilic polymer chain is chemically bound to the functional groups on the activated surface of the polymeric material at a number of binding points. On the other hand, in the product of J'884, there is only a physical coating, no chemical binding, at several points of the resin. Thus, both of the modifying method and the chemical structure of the product in the prior art J'884 are different from those of the present invention. Consequently, J '884 does not teach, disclose the present invention. Therefore, J '884 does not anticipate the rejected claims.

Pursuant to the rejection of Claims 46, 48, 49, 50, 53, 53 and 55 under 35 U.S.C. §102(b), the Office Action cites J '231. It discloses a highly functional film comprising a water-

soluble vinyl polymer on the surface of polytetrafluoroethylene.

J '231 describes that a water-soluble vinyl polymer such as polyacrylamide or polyacrylic acid is chemically bound to the surface of polytetrafluoroethylene. The method is as follows: a polytetrafluoroethylene material is subjected to a plasma treatment and the treated material is quickly reacted with a monomer before it is deactivated. The reference does not disclose the use of a catalyst or initiator in the hydrophilic polymer treatment step. The process of J '231 gives a product in which graft-polymers are formed from each of active points produced on the polytetrafluoroethylene. Namely, each of the graft-polymers is bound to the polymeric material at one binding point.

On the other hand, as described above, in accordance with the present invention the product formed has a hydrophilic polymer chain that is chemically bound to the functional groups in the activated surface of the polymeric material with a considerable number of binding points. Thus, both of the modifying method and the chemical structure of the product in the prior art J'231 are different from those of the present invention. Consequently, the rejected claims are not anticipated by the present reference. Withdrawal of the rejection is respectfully requested.

Pursuant to the rejection of Claim 28, 29, 31, 33, 36, 37, 42, 43, 46, 53, 55 and 56 under 35 U.S.C. §102(e), the Office Action cites Valint Jr., et al. According to the Office Action, Valint, Jr. et al disclose plasma oxidation treatment of a silicone material followed by plasma polymerization of a hydrocarbon monomer to provide a polymeric hydrocarbon layer that is further treated with plasma or treated by attachment of hydrophilic polymer chains to render it hydrophilic. See the Abstract, column 3, lines 38-67, column 4, line 59, to column 5, line 12. The product is a contact lens having a hydrophilic polymeric coating on a silicone base.

Valint, Jr. et al. disclose the preparation of a contact lens having a hydrophilic polymerization of a silicone base. The process comprises three sequential steps; (a) subjecting the surface of a silicone hydrogel contact lens to a plasma oxidation reaction, (b) subjecting the oxidized surface of the lens to a plasma polymerization reaction in a hydrocarbon atmosphere comprising a diolefin having four to eight carbon atoms in the effective absence of oxygen, to form a carbon layer having a thickness of at least 50 to 500 Angstroms; and (c) rendering the carbon layer of step (b) hydrophilic by either subjecting the surface to a plasma oxidization or by a secondary coating of a hydrophilic polymer. The reference does not teach or disclose the step of the hydrophilic polymer treatment carried out in the presence of catalyst or initiators as in the present invention. More specifically, the reference does not teach or disclose conducting the step of treating the silicone base with hydrophilic polymer in the presence of an initiator or catalyst. Thus, their method is different from that of the present invention.

The chemical structure of the product obtained by this cited art is as follows; the product is covered with a carbon layer prepared by the plasma graft polymerization. The surface of the carbon layer is further oxidized by a plasma treatment or coated secondarily with a hydrophilic polymer. As the carbon layer is prepared by a plasma graft polymerization, each definitely of the graft-polymers is bound to the substrate at one binding point.

This is in contrast with the present invention wherein a hydrophilic polymer chain is chemically bound to the functional groups in the activated surface of the polymeric material with a considerable number of binding points.

Thus, both of the modifying method and the chemical structure of the product in the Valint Jr. et al. is different from that of the present invention. Thus, the rejected claims are not anticipated by the prior art, withdrawal, of the rejection is respectfully requested.

Pursuant to the rejection Claims 28, 29, 31, 33, 36, 37, 42, 43, 46, 53, 55 and 56 under 35 U.S.C. §102(e) the Office Action cites Grobe, III et al.

Grobe, et al. III disclose a plasma oxidation treatment of a silicone material followed by plasma polymerization of a hydrocarbon monomer to provide a polymeric hydrocarbon layer that is further treated with plasma to render it hydrophilic or further treated by attachment of hydrophilic polymer chains. The product is a contact lens having a hydrophilic polymeric coating on a silicone base.

The methodology of preparing the product is quite different from the present invention. More specifically Grobe III, et al. discloses a method treating the surface of a silicon medical device comprising the steps of:

(a) subjecting the surface of said silicone medical device to an oxidative plasma treatment;

(b) subjecting the oxidatively plasma treated surface of the silicone medical device to a plasma polymerization reaction in a hydrocarbon atmosphere to form a carbonaceous polymeric surface on the lens having a thickness of 50 to 500 Angstroms; and

(c) grafting a mixture of polymerizable ethylenically unsaturated monomers comprising hydrophilic monomers onto the carbonaceous polymeric surface by means of a free-radical reaction, thus forming a biocompatible surface on the medical device.

Grobe, et al. III's method does not contain the step of carrying out the hydrophilic polymer treatment in the presence of catalyst or initiators, as in the present invention. Thus, this method is different from that of the present invention.

The chemical structure of the product, silicone medical device, obtained by Grobe

et al. III art is comprised of each of the following three structures; the surface oxidized by a plasma treatment, the structure covered by carbonaceous polymeric product and the graft polymer which is formed by grafting a mixture of polymerizable ethylenically unsaturated monomers comprising hydrophilic monomers onto the carbonaceous polymeric surface by means of a free-radical reaction. Each of the graft-polymers is bound to the substrate at one binding point.

On the other hand, in the process of the present invention a hydrophilic polymer chain is chemically bound to the functional groups in the activated surface of the polymeric material with a considerable number of binding points. Thus, this structure is quite different from that of the product produced in Grobe, et al. III. Thus, both the modifying method and the chemical structure of the product in Grobe,III et al. are different from those of the present invention. Thus, Grobe III et al. does not anticipate the rejected claims. Withdrawal of the rejection is respectfully requested.

Pursuant to the rejection of Claims 28, 29, 31, 22, Claims 28, 32-34, 46, 53, 55 and 59 under 35 U.S.C. §102(b), the Office Action cites J'267.

J'267 discloses a process in which a polyester yarn treated by a UV pulse laser beam is dipped in an aqueous adhesive liquid (for instance, resorcin formalin rubber latex (RFL)). It only provides the polymer coating method by dipping. This method is different from the method of the prevent invention. It fails to disclose that the polymer coating method is carried out in the presence of catalyst or initiators. Thus, J '207 does not disclose or teach the present process.

Moreover, in accordance with the process described in J '207, the polyester yam treated by a UV pulse laser beam is only treated by dipping it in an aqueous adhesive liquid

(RFL). Thus, the RFL is deposited on the surface of the yarn. There is no covalent bond formed.

On the other hand, in accordance with the present invention, a hydrophilic polymer chain is chemically bound to the functional groups in the activated surface of the polymeric material with a considerable number of binding points. Thus, both of the modifying method and the chemical structure of the product in J'267 are different from those of the present invention. Consequently, the subject matter of the rejected claims are not anticipated by the prior art; withdrawal of the rejection is respectfully required.

Pursuant to the rejection of Claims 28, 32-35, 46, 53 and 55 of the Office Action cites J'207 under 35 U.S.C. §102(b).

J'207 discloses a process in which a hydrophobic porous film treated with corona discharge is dipped in a solution of polyol. However, it does not teach or disclose that the dipping step is conducted in the presence of the catalyst or initiator. A quick review of the abstract clearly reveals that there is no mention of this step being conducted in the presence of a catalyst or initiator. This method is different from the method of the prevent invention in which the hydrophilic polymer treatment is carried out in the presence of catalyst or initiators.

As the film treated with corona discharge is treated by dipping it in an aqueous polyol solution, in J'207, the hydrophilic polymer is only deposited on the surface of the yarn. There are no covalent bonds between the porous film and the polyol.

On the other hand, in accordance with the present invention above, a hydrophilic polymer chain is chemically bound to the functional groups on the activated surface of the polymeric material with a considerable number of binding points.

Thus, both of the modifying method and the chemical structure of the product in

the art J'267 are different from those of the present invention. Consequently, the rejection of Claims 28, 32-35, 46, 53 and 55 under 35 U.S.C. §102(b) is obviated; withdrawal thereof is respectfully requested.

Pursuant to the rejection Claims 28, 32-34, 46, 53, 55 and 59, under 35 U.S.C. §102(b) the Office Action cites J'783. J '783 discloses a process comprising subjecting a polyolefin to ozone treatment, then graft-polymerization with a vinyl compound under UV irradiation. Thus, J '783 does not disclose the second step of the present process, viz., treating the activated polymeric material produced in the activation step with a hydrophilic polymer in the presence of a catalyst or initiator. The graft polymerization is a grafting step. This step is quite distinct from the second step of the present process in which the activated polymeric material is treated with hydrophilic polymer in the presence of a catalyst or initiator.

In J'783 materials are subjected to an ozone treatment and the oxidized polymeric materials are then subjected to monomer grafting by UV irradiation. Thus, the chemical structure of the surface of the final product comprises graft-polymers which are formed from the functional groups introduced by the ozone treatment. As explained on Page 13 of the Response, the graft polymer chains are bound to polymeric material only at the chain end.

The monomers used in the examples in J '783 were methyl methacrylate and acrylamide; the graft polymer of methyl methacrylate is hydrophobic, and the graft polymer of acrylamide was further subjected to the Hoffman arrangement to modify the hydrophilic property.

As mentioned above, in accordance with the present process hydrophilic polymer chain is chemically bound to the functional groups on the activated surface of the polymeric material with a considerable number of binding points. Therefore, the chemical structure of the

graft polymer formed on the polymeric material as described in J '783 is different from that of hydrophilic polymer treatment.

Thus, both of the modifying method and the chemical structure of the product in the art J'783 are different from those of the present invention. Withdrawal of the rejection is respectfully requested.

Pursuant to the rejection of Claims 28, 32-3 5, 46, 48-5 3, *55* and 59, the Office Action cites Young, Sr. et al.

Young Sr. et al. discloses a method to make a solidified fiber product which comprises dry discontinuous fibers by spraying a starch binder or other commercial binder in *5-* 20% amount by weight of the fiber, followed by depressing and curling, and a method to adhere solid particles to the fibers with a binder.

Namely, Young, Sr. et al. provide a method of coating a polymeric binder to a fiber product by spraying or adhering a binder to fibers. According to example 1 thereof, as a fiber mixture contains mainly cellulose fiber, the fiber is coated with a binder containing starch or commercial binders which contain adhesives preferable for cellulose. Therefore, the Young, Sr. et al's method is different from the method of the present invention in that it fails to subject a polymeric material to an activation treatment. Further, the method of Young, Sr. et al. fails to treat said activated polymeric material produced in the step with a hydrophilic polymer under conditions effective to produce said modified polymer, the presence of catalysts or initiators.

The chemical structure of the product obtained in the Young, Sr. et al's method is composed of only fibers coated or adhered to each other with a polymer binder. On the other hand, as described above, in accordance with the present invention hydrophilic polymer chain is chemically bound to the functional groups in the activated surface of the polymeric material with

a considerable number of binding points.

Thus, both of the modifying method and the chemical structure of the product in Young, Sr. et al. are different from those of the present invention. Therefore the rejection is overcome; withdrawal thereof is respectfully requested.

Pursuant to the rejection of Claims 28, 29, 32-36, 38, 42, 46, 48, 49, 53, 55 and 56, the Office Action cites Janssen.

The Janssen's method is the graft polymerization of monomers to hydroperoxidized polymeric materials in the presence of catalysts or radical initiators such as AIBN. If desired or appropriate, the polymerization may be, at least in part, conducted in the presence of actinic radiation or the like, with or without the presence of a photoinitiator. For instance, a main polymeric material, particulate hydroperoxidized poly-N-vinyl lactam is prepared by subjecting it to an effective amount of ozone.

However the method in Janssen does not disclose the step that hydrophilic polymer treatment is carried out in the presence of catalyst or initiators. Thus, the process described in Janssen does not anticipate the present invention.

The chemical structure of the product prepared by the Janssen's method is that the graft polymer is bound to the hydroperoxidized surface of the polymeric material. Each of the graft polymers is bound to the substrate at its molecular end.

On the other hand, in accordance with the present invention, a hydrophilic polymer chain is chemically bound to the functional groups in the activated surface of the polymeric material with a considerable number of binding points, as explained above.

Thus, both of the modifying method and the chemical structure of the product in Janssen's method are different from those of the present invention.

Pursuant to the rejection of Claims 28, 29, 32-36, 38, 40-42, and 46-59 under 35 U.S.C. §102(b) the Office Action cites Zhang et al.

Zhang et al's disclose a process for producing a material having hydrophilic surface which comprises:

(1) the first step of forming a hydrophobic photopolymerizable composition comprising a hydrophobic compound (a) having two or more polymerizable unsaturated double bonds per molecule and a photopolymerization initiator into a desired form selected from thin film, fiber, bead, and other forms to produce a shape (b);

(2) a second step of bringing the surface of the shape (b) (a glass plate as in Example 1) into contact with a hydrophilic liquid (d) containing a hydrophilic compound (e) having one or more polymerizable unsaturated double bonds; and

(3) the third step of irradiating the shape (b) with actinic rays while keeping the shape (b) in contact with the hydrophilic liquid (d),

(4) said third step being conducted in such a manner that (i) the shape (b) is cured, (ii) the hydrophobic compound (a) is copolymerized with the hydrophilic compound (c) at the interface between the shape (b) and the hydrophilic liquid (d) to thereby chemically bound molecules of the hydrophilic compound (c) to the surface of the hydrophobic shape (b), and

(iii) the hydrophilic liquid (d) is prevented from undergoing any photopolymerization reaction therein except at said interface.

Namely, their method is a process to produce a material which surface is covered with a film prepared by graft polymerization. Their method fails to disclose a step whereby the hydrophilic polymer treatment step is carried out in the presence of catalyst or initiators, as required in the present process. Thus, the prior art reference fails to teach or disclose the process of the present invention.

The chemical structure of the products of the Zhang et al's method is characterized by a surface covered with a film which was made by the copolymerization of a hydrophobic compound having two or more polymerizable unsaturated double bonds per molecule with a hydrophilic compound having one or more polymerizable unsaturated double bonds. Each of the graft polymers is bound to the substrate at its molecular end. On the other hand, as described above, the product of the present invention contains a hydrophilic polymer chain is chemically bound to the functional groups in the activated surface of the polymeric material with a considerable number of binding points.

Thus, both of the modifying method and the chemical structure of the product of Zhang et al's patent are different from those of the present invention. Thus, this reference does not anticipate the present invention. Withdrawal of the rejection is respectfully requested.

Therefore in view of the amendments to the Claims and the Remark hereinabove, it is respectfully submitted that the present case is in condition for allowance, which action is earnestly solicited.

Respectfully submitted,

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